BODY BUILDER INFORMATION

The Incomplete Vehicle Document (IVD) is supplied with each incomplete vehicle, and provides information that should be used by intermediate and final stage manufacturers in determining conformity to applicable Federal Motor Vehicle Safety Standards (FMVSS). The IVD also includes information which must be followed in order to ensure that Environmental Protection Agency (EPA) and California emissions certification requirements and NHTSA Fuel Regulations are met.

This Body Builders Book contains information that may be used in addition to the IVD for any manufacturer making alterations to an complete/incomplete vehicle. No alteration should be made to the incomplete vehicle which either directly or indirectly results in any component, assembly or system being in nonconformance with any applicable Federal Motor Vehicle Safety Standard or Emission Regulation. Intermediate and final stage manufacturers should be familiar with all Federal Motor Vehicle Safety Standards and Emission Regulations and aware of their specific responsibilities as manufacturers.

For further assistance contact Upfitter Integration at: 1 (800) 875–4742

Section 0 – General Instructions

Check for proper clearance between body members and chassis components which may in any way affect the reliability and performance of the vehicle by developing abrasion and wear points from moving parts or degradation from extreme environment or thermal exposure or may increase interior noise.

Check headlamp aim and all vehicle illumination systems for proper operation when the vehicle has been completed. Re-aim headlamps when necessary. Check for proper operation of windshield washer, wipers and defroster system.

Extreme care must be taken when working on vehicles equipped with Brake Control Module (BCM), Engine Control Module (ECM), Powertrain Control Module (PCM), Transmission Control Module (TCM), Vehicle Control Module (VCM). (See Owner's Manual).

If arc-welding is employed on the chassis, precautions must be taken to protect all vehicle components, especially brake, fuel lines and fuel tank assembly, electrical wiring and BCM/ECM/PCM/TCM or VCM. To avoid electronic component damage, disconnect battery (batteries); disconnect the negative cable first, followed by the positive. To reconnect cables; connect the positive first, then the negative.

All labels on the vehicle (any message applied to the vehicle or vehicle component that informs, instructs, or warns) must appear on the completed vehicle so the user can read them easily and without obstruction.

Service and service replacement parts for your add-on systems may not be available from a GM dealer. Those installing aftermarket systems should provide information as to where and how to obtain service.

When installing a Power Take-Off (PTO) with hydraulic lines, the following care should be exercised:

- Route and secure all hydraulic lines so that they are not in close proximity to any parts of the exhaust system. Keep all fittings and connections away from the exhaust system. Make sure connections and fittings cannot leak on the exhaust system.
- Exhaust system heat can damage and degrade hydraulic lines and components. Oils and hydraulic fluid coming in contact with a hot exhaust system could result in a fire.

Section 1 – Body

Body structures, interior and accessory arrangements must be designed into the vehicle to provide for proper load distribution on both axles and not to exceed any gross axle weight ratings. Lateral load equalization must also be maintained. The resultant Center of Gravity of the unladen vehicle must be within the limits tabulated in the FMVSS 105 and FMVSS 121 section of the IVD.

Body insulation provided by General Motors should not be removed. This includes any thermal or underbody heat shields. This insulation is provided to protect the vehicle body and occupants from excessive heat and/or provide noise attenuation. Any replacement material internal to the occupant compartment must be certified for MVSS standard on flammability. Areas of specific concern, but not limited to are:

- Underbody exhaust, muffler and tailpipe shields and insulators.
- Rear load floor interior insulation.
- Front floor interior insulation.
- Dash mat insulation.
- Engine cowl insulation - interior and exterior.
- Engine cover insulation.

Accessory items such as refrigerator, hot water heater, furnace, etc., which operate on liquid propane gas should be located and protected to prevent exposure to any flame.

Seating

If body builder installs seating other than that supplied with vehicle, it is the body builder's responsibility to ensure that the seating and restraint systems comply with FMVSS requirements. The restraint systems supplied with the vehicle were designed to accommodate the seating reference points and seat travel of the original equipment seats only.

Air Conditioning

For additional information refer to ***Engine - Section 6.***

NOTE: Air conditioning systems using R-134A refrigerant are equipped with metric fittings to prevent interchange with R-12 refrigerant components. Do not interchange R-134A components, refrigerant oil or service equipment with R-12 components, refrigerant oil or service equipment.

Section 2 – Frame

Hole drilling, welding, modifications, or alterations to the frame assembly are the responsibility of persons performing these operations. These same individuals assume complete responsibility for frame assembly reliability, performance after alterations and compliance to applicable FMVSS requirements.

The following procedures and specific precautionary instructions are recommended for proper installation of special bodies and/or equipment on GM frames. Failure to follow these recommendations could result in serious damage to the basic vehicle.

Flanges

Do not drill holes in frame flanges.

Holes

Holes to mount brackets, supports, and out-riggers must be drilled in the vertical side rail web with the following restrictions:

- The minimum edge distance between any two (2) holes must be larger than twice the diameter of the larger hole.
- No holes should exceed 20 mm (0.75 in.) in diameter.
- All holes should be drilled in the frame using appropriate drilling practice and safety precautions.

Welding

CAUTION: Fuel tank and fuel lines must be drained and all vapors purged to ensure non-combustible mixture before any welding, brazing or soldering.

When welding side rails, crossmembers and brackets (50,000 or 80,000 PSI yield strength), emphasis is placed upon weld application techniques to avoid stress risers that may adversely affect frame operating stresses.

When welding is performed anywhere on the vehicle, precautionary measures should be taken to prevent damage to electrical system wiring or components. Prior to any welding, parts or components which could be damaged by excessive temperatures must be removed or adequately shielded; the battery cables should be disconnected at the battery. Also prior to welding, the area to be welded and surrounding area must be cleaned of all frame protective coating. After welding, when parts are cool, carefully inspect wiring and electrical components for shorts or other damage which could draw excessive currents and possibly cause an electrical system short when the battery is reconnected. Apply protective coating to areas where coating was removed.

Alterations

If the wheelbase is modified, the alterer must take responsibility for compliance with affected motor vehicle safety standards and also for warranty on items such as driveshafts, universal joints, center bearings and rear transmission tailshaft, transfer case and transmission case fractures, output shaft bushings, bearings, brakes, fuel systems and any other related component failures and the that Anti-lock Brake System (ABS) Module may require reprogramming. Additionally, the customer must be alerted in the modifier's owners manual that parts for the reworked area are not available through the General Motors service parts system.

Shear Plate Attachments

Attachments of shear plates should be accomplished by using existing manufacturing holes already available in the frame side rails. Manufacturing holes, normally 16 mm in diameter, are consistently placed along the frame side member in the center of the web on each frame.

When additional holes are required for shear plate attachment, they should be no larger than 20 mm (0.75 in.) in diameter. Holes are to be drilled no closer than 63.5 mm (2.5 in.) apart. For holes drilled forward of the rear axle, centers are to be no closer than 63.5 mm (2.5 in.) from the top or bottom flanges and no closer than 89 mm (3.5 in.) from any suspension attachments. For frame holes drilled rearward of the rear axle, hole centers are to be no closer than 51 mm (2.0 in.) from the top or bottom flange and no closer than 89 mm (3.5 in.) from suspension attachments.

No additional holes or notching of either top or bottom frame flanges is allowed.

Section 3 – Front Suspension

See chassis data information for clearances and assistance in calculating trim heights.

The following statement applies to P models only.
Clearance should be provided for the tire used while in full jounce (upward travel) against metal stops and at full left-hand and right-hand turn. The clearance envelopes will be provided upon request. ***(See Section 5)***.

Since there is a large variation in completed vehicle front weight due to differences in body weight and equipment, the front suspension alignment must be checked and reset if necessary after the vehicle is completed. Caster should be set with reference to the "A" dimensions. Camber is designed into the axle and cannot be adjusted.

See Truck Service Manual for complete alignment procedure, specifications and measurement of the "A" dimension under "Diagnosis and Front Alignment" section.

Section 4 – Rear Suspension

Clearance to body should be provided for the suspension, axle, driveshaft and tires under the following conditions: (1) Axle in full jounce against the metal-to-metal stop, (2) Axle at 4.5° roll with one side of axle in full jounce at the metal to metal stop and (3) Axle at design position. Allowance for the tire chain clearance shown on a maximum grown tire must allow for (1.66 in.) clearance to the sides of the tire and (2.5 in.) to the top of the tire. Be sure sufficient clearance is provided for suspension, axle and tire and wheel in full vertical travel (up and down).

NOTE: Notification to the consumer may be required in certain states if tire chains cannot be used.

Pipes, wiring, conduits and any other related components must not be placed where they cross the path of motion of the rear axle, driveshaft, axle brake pipes, hoses, spring or tires. Such crossing could result in rupture, wear-through, or separation due to normal axle motion.

NOTE: Any alteration to wheelbase or tire rolling radius may require re-programming of the ABS module.

See chassis data information for additional clearances and for assistance in calculating trim heights.

Section 5 – Brakes

See Truck Service Manual for brake specifications.

Due to the critical nature of brake systems, anyone making modifications or alterations must assume complete responsibility for system reliability, performance and certification to FMVSS 105 or FMVSS 121.

It is mandatory that no change be made to the brake main cylinder location, brake pedal push rod length or pedal position.

Ensure that hydraulic brake system is free of air and hydraulic leaks. Bleed brakes if required following procedures as outlined in truck chassis service manual. Ensure that vacuum booster system or hydroboost system is functional and free of leaks.

Check master cylinder fluid level and fill as necessary. (Refer to Owner's Manual)

Check power steering fluid level for models equipped with hydroboost brake. (Refer to Owner's Manual)

Added floor covering or carpeting must not restrict service or brake pedal travel from released position to full pedal travel.

No body part or chassis-mounted component may be located within 2.0 in. of brake hose routing in all wheel and axle positions. All exhaust system components must also have a minimum of 2.0 in. clearance to brake hoses in closest positions. (Be sure to account for brake hose travel with suspension).

Body builder is to verify that the brake warning switch is operative.

Air Brake Systems

When any air-operated equipment is added to the vehicle, it is mandatory that a pressure protection valve be installed between such equipment and the main air supply to prevent loss of air to the brakes.

No body parts or chassis-mounted component may be located within 2.0 in. of brake hose routing in all wheel and axle positions; Be sure that brake hose travel is accounted for.

Chassis heat shields, added by the original manufacturer, should not be removed. Any air brake lines added or revised that are near the exhaust must be shielded.

Section 6 – Engine

For additional information refer to ***Section 1–Body.***

Air conditioning and auxiliary belt-driven equipment installation recommendations:

No alterations or additions to the accessory drive belt system will be warranted on either multiple belt systems or serpentine belt systems.

Multiple belt systems may incorporate several conventional V-belts, or a combination of conventional-V and poly V-belts. If modification to this type of system is made, the following should be considered:

- The addition of a pulley sheave forward of the production sheaves may subject the crankshaft and water pump bearings to loads beyond the desired limits.
- Generally, an added load is preferable in the first belt track closest to the engine to minimize the overhang moment effect on bearings.
- Heavy or improperly balanced pulleys may contribute to bearing failure because of load induced by their mass and/or unbalance. It is extremely important (especially on the water pump) to have well-balanced and concentric pulley sheaves in order to avoid premature bearing failure. Pulley unbalance must not exceed 0.25 oz. in., and lateral and radial runout must not exceed 0.010 in. in T.I.R.
- The fan, fan clutch and fan drive ratio (fan pulley diameter ÷ crankshaft pulley diameter) that come with the vehicles are matched to the equipment and conditions encountered in normal operation. Substitution of the fan and/or fan clutch and fan drive ratio may affect cooling performance. A substitute fan may be subjected to excessive stresses and might break. Substitution is therefore not allowed.
- The incorporation of an aftermarket air conditioning system could have the following consequences:
  - — Vehicle/engine/coolant overheating in certain geographical areas that normally experience high ambient temperatures.
  - — Restrictions to engine cooling fan airflow resulting in higher fan blade stress.
  - — The cooling system was not designed for an A/C condenser to be mounted in front of the radiator core.
  - — Inadequate air conditioning performance unless system capacity is enough to cool the interior space of the completed vehicle.
- Addition or relocation of items in front of or behind the arc of the fan blade travel, or changes to fan fore and aft location relative to accessory drive, may alter fan stresses, and could contribute to fan blade failure. Moving the fan and/or clutch forward is also likely to overload the water pump bearing.
- The addition of air conditioning could affect conformance to FMVSS 301-Fuel System Integrity. The added equipment, in the event of an accident, could be displaced into and possibly rupture fuel system lines, hoses filters and equipment. Care must be taken not to affect such conformance.
- The curb weight of the vehicle will be affected by the weight of the added system.

In multiple belt systems, belt tension must be measured using either a mechanical gage (such as Borroughs or Kent–Moore) or an electronic gage (G.S.E. or Beta-Tech). Each gage model is calibrated for a specific type and size of belt: E.G., 3/8 in. V, 4-rib poly-V, 6-rib poly-V, 1/2 in. V, etc. Therefore, it is necessary to follow the gage manufacturer's usage instructions to get correct readings. Refer to the appropriate shop manual for tension settings.

Due to the critical nature of the accelerator system, anyone making modifications or alterations assumes complete responsibility for system reliability, performance and compliance to FMVSS 124. Caution must be exercised so that the accelerator cable is properly routed. Specifications are as follows:

- Route cable to maximize all bend radii. In no case should bend radii be less than 3 in. (76 mm).
- Minimum distance from exhaust manifold to be 6.0 in. (150 mm), unless a heat shield is provided.
- Do not use accelerator cable or clips to route wires, harnesses or other cables. Cable sheath must be clipped so as not to pinch inner cable. Cable must not be loose in clip allowing sheath to move when accelerator pedal is applied and released.
- Cable must not be subjected to kinking or routing across any sharp edges.
- Cable routing must be perpendicular to the surface of the front-of-dash at the dash fitting. No objects or routings should force cable to have a bend at the dash fitting. Flexible components (hoses, wires, conduits, etc.) must not be routed within 2.0 in. (50 mm) of moving parts or accelerator linkage unless routing is positively controlled.
  - — Caution must be taken so that the accelerator pedal remains properly located. Guidelines for accelerator pedal locations are as follows:
  - — Ensure that the accelerator can freely operate from idle to wide-open throttle position and return. Make sure that the pedal will not hang up on any nearby items such as carpets, floor, screws, wiring harnesses, etc. Engine cover should have at least one inch (25 mm) clearance to side of accelerator pedal with the carpet mat installed.

— Accelerator to brake pedal relationship has been designed to provide minimum driver movement and should not be altered in any way.

Gasoline engine air induction, exhaust and cooling (fan) system is certified and in compliance with the Federal Vehicle Noise Requirements.

Gasoline engine air induction and/or ignition system is certified in compliance with the Federal Vehicle Emission Standards. Any alterations to the systems or components could void compliance and render the vehicle illegal. System includes:

- Fuel system – throttle body injector (TBI) or central port injector (CPI) and associated tubes, hoses and pipes, air cleaner outside air hose and spacer heat stove and heat stove pipe, fuel pump and inlet manifold, fuel vapor canister.
- Cooling system – fan, fan clutch, drive and driven pulleys.
- Exhaust system – muffler, cat. convertor,piping (sizing).
- Air Induction system – air cleaner, duct work.
- Ignition system distributor and initial spark timing setting, spark plugs, spark plug wires.
- Crankcase ventilation system.

Diesel engine induction and injector pump system is certified to be in compliance with the Federal Vehicle Emission Standards and/or Noise Standards. Any alterations to the system or components could void compliance and render the vehicle illegal. System includes:

- Fuel system – Injection pump, injector lines and injectors, fuel return hoses and pipes, air cleaner, outside air hose, fuel pump, fuel filter, fuel heater assembly and intake manifold.
- Exhaust system.
- Crankcase pressure regulation system.
- Charge air cooler system.
- External engine components such as air cleaner, crankcase pressure regulator valve, alternator, injection pipes, fuel return hoses from injectors, exhaust manifolds, oil fill pipe, etc., must be provided with sufficient clearance for engine roll and torque.
- When a vehicle is equipped with a electronic fuel injection (EFI) engine, it has an engine control module ECM/PCM/TCM or VCM. This ECM/PCM/TCM or VCM must be maintained at a temperature below 185°F at all times. This is most essential if the vehicle is put through a paint baking process. The ECM/PCM/TCM or VCM will become inoperative if its temperature exceeds 185°F. Therefore, it is recommended that temporary insulation be placed around the ECM/PCM/TCM or VCM during the time the vehicle is in a paint oven or undergoing another high temperature process.

Section 7 – Transmission

Models equipped with automatic transmissions have neutral/park start safety mechanical lockout feature, which interfaces with the steering column ignition switch. Starter should operate only when gear shift lever is in neutral or park position. Readjust the shift linkage if necessary as outlined in the Truck Service Manual.

Power Take-Off (PTO) systems refer to ***Section 0–General Instructions***.

- In instances where it is necessary to drain and refill or add fluid to the transmission, such as when installing PTO, ***DO NOT*** substitute any other lubricant. Installation of other lubricants may result in internal transmission damage.
- Models equipped with Eaton manual transmission have synthetic lube installed as the factory fill. When the transmission is drained for PTO installation, it must be refilled with synthetic lube GM P/N 12345724 or Eaton approved 50 weight synthetic gear lube.

Section 8 – Fuel and Exhaust

Fuel Systems

Due to the critical nature of sealing the fuel system, anyone making modifications or alterations to the existing system must assume complete responsibility for the system reliability, performance and compliance to Government Regulations.

The fuel evaporative emission control equipment is certified to be in compliance with the Federal and California Vehicle Emission Standards. Any alterations to systems or components and their location could void compliance. The system includes:

- Fuel tank, metering unit, lines including purge control solenoids and canister or canisters.

For these reasons,

NO ALTERATION OF THE FUEL SYSTEM IS RECOMMENDED

Temporary Tank

The temporary fuel container and sender unit must be replaced with a permanent fuel tank assembly prior to placing the vehicle into use. The replacement tank supplier and/or body builder is responsible for certifying evaporative emissions.

Fuel Lines

Fuel line routing precautions:

- When using nylon fuel lines, operating environment should not exceed 194°F continuous and 239°F soak.
- 12 in. minimum clearance to exhaust system is required or a metal shield must be provided.
- Fuel lines should be clipped to chassis to prevent chafing. Metal clips must have rubber or plastic liners.
- Use corrosion resistant steel tubing with short sections of approved hose to connect components. Hose-to-tube connections should be clamped for diesel systems. Steel tube ends should be beaded for hose retention. Fuel supply is pressurized by an in-tank pump for TBI gasoline systems. Coupled hose connects must be used. Clamped hose is not acceptable for TBI and CPI systems.
- Nylon fuel lines cannot be altered

All engines require a fuel return system which returns excess fuel from the injection pump and injector nozzles back to fuel tanks. Care should be taken that these lines are not blocked nor their hoses pinched. The engine may run poorly or stall if these lines are restricted or blocked.

All gasoline engine vehicles are equipped with fuel evaporative emission control equipment which is certified to be in compliance with the Federal or applicable California vehicle emission standards. Alterations to fuel tank and metering unit, lines, canister or canisters, canister filters, canister purge control valves, relay switches, tank auxiliary vent valve, engine speed controller, or other devices/systems are therefore not allowable since vehicle adherence to C.A.R.B. and Federal regulations may be affected.

Diesel powered vehicles may incorporate water drain provisions in the fuel system. These valves are only to be opened when siphoning water and contaminants from the fuel system.

Fuel Tank

The tank must have a minimum clearance of 2 in. top, front, rear and sides to body and other supports.

Tank may be pressurized to 1.25 psi maximum to check for final line leakage or for forcing fuel through the system. Pressures greater than this amount may be detrimental and affect tank durability.

The use of auxiliary fuel tanks is not recommended. If an auxiliary fuel tank is added, the alterer must take responsibility for compliance with affected motor vehicle safety standards. Also, if an auxiliary fuel tank is added to a gasoline-powered vehicle, the fuel must be drawn through a pipe at the top of the tank (balance line between tanks is not permitted).

Gasoline fueled vehicles are now equipped with a fuel pump return line. If an auxiliary tank is added, the tank selector valve must include a return port which returns fuel to the tank from which the fuel is being drawn.

In gasoline engines the fuel pump is located in the fuel tank. The battery must be disconnected before starting any work on the fuel system.

In the use of dual fuel systems, the vehicle operator should strictly adhere to the manufacturer's procedures for switching from gasoline to gaseous fuel operation. Improper switching procedures may result in overheating and damage to the exhaust system and the vehicle. The gaseous fuel tank should not be mounted in an enclosed area of the vehicle, such as the passenger compartment, truck, etc., and the system should be vented to the outside of the vehicle. In addition, vehicles converted to gaseous fuels should not be stored in enclosed places such as garages. Further, General Motors cautions purchasers that the design, location and installation of any type of fuel storage system involves significant technical and engineering considerations and that these statements on gaseous fuel conversions should not be interpreted to be an approval by General Motors of any modification to the original equipment fuel system.

Conversions to gaseous fuel should be made in conformance with applicable Federal and State regulations. Removal of emission-control components, or the addition of gaseous fuel systems which could damage or reduce the longevity of those components and could also cause the mechanical and emission performance warranty to be voided.

Exhaust System

Particular care should be taken to prevent the possibility of exhaust fumes and carbon monoxide exposure to vehicle occupants in units completed by body builders. Holes and openings through the floor and all other parts of the body must be permanently and adequately sealed by the body builder to avoid exhaust intrusion into any occupant area. If it is necessary to change the exhaust outlet location, the exhaust discharge must be unobstructed and directed away from occupant areas. Alteration of the exhaust outlet or its position may increase exhaust noise and render the vehicle

illegal in those areas with pass-by noise regulations. All vehicles >10000 lbs. GVWR come under Federal noise regulations of the Environmental Protection Agency; see those regulations for rules, test procedure and noise levels permitted.

Tail pipe outlet location must be tested statically and with the vehicle in motion to ensure that exhaust gases do not penetrate side or rear windows or under body seams and holes. Auxiliary power plants should also be tested under the same conditions. Tail pipe extension must extend 2.0 to 2.5 in. outboard of body side panels. Tail pipe exit ahead of rear wheels is not recommended.

Check for leaks in exhaust systems and repair as required.

Exhaust temperatures can exceed 1600°F under extreme operating conditions, with pipe surface temperatures slightly less than this. Extreme care must be used when placing body components in the proximity of the exhaust system so as not to exceed the rated temperature limits of the components. Due to variants in underbody configurations of the vehicles, we are not in a position to make recommendations on how to insulate or design components in the proximity of the exhaust system.

Each manufacturer must make temperature checks of critical areas of his vehicle and adjust his design accordingly, or provide shielding to ensure safe operation of his body components.

The same can be said for the engine compartment. Obviously there will be additional heat radiated from the engine. How much is retained in the area will depend on how well this area is ventilated in your individual designs. Here again, temperature checks of interior areas surrounding the engine should be made to determine if your insulation is adequate. This is the same engineering practice we have followed on our complete vehicles incorporating these exhaust systems.

Exhaust system materials are selected and tested to withstand the operating environment of the vehicle. Do not modify the exhaust system in any way. The tail pipes are made of 409 stainless steel or aluminized steel.

Heat shields are mounted to the underbody and/or exhaust system components (catalytic converter and muffler). Shields for the propshaft hanger bearings are also provided in some vehicles.

Section 9 – Steering

Check power steering fluid level and system operations. ***(Refer to Owner's Manual).***

Steering wheel and horn pad must not be altered or replaced.

The steering column mast jacket not to be altered.

Section 10 – Tires

Check wheel lug nuts for proper torque; specifications are provided in the Owner's Manual.

Substitution of tires of greater capacity than those offered as original equipment by vehicle manufacturer is not approved for use on original equipment wheels. Any usage of higher capacity tires must be accompanied by higher capacity wheels with the same type mounting and fasteners. However, the wheel offset and distance from centerline of rim to wheel mounting face must be the same as the replaced original equipment wheel to ensure proper wheel bearing loading and clearance of tires to body and chassis components.

Increasing tire and wheel capacity does not necessarily increase vehicle GVW ratings.

It is recommended that tire chain clearance guideline, J683 from the Society of Automotive Engineers be adhered to in designing rear wheelhouse clearance.

Check tires and inflate to recommended tire pressure according to the tire pressure information provided in Owner's Manual and tire inflation label provided with vehicle.

Any substitution of tires may affect Speedometer/Odometer accuracy.

Section 12 – Electrical Battery and Battery Cables

The vehicle battery should be located and positioned to make use of the existing battery cables. If the battery requires relocation and longer cables are required, a proportionately larger gauge wire must be used. If in relocating the battery the negative ground cable is attached to frame rail, a cable of similar gauge must be provided between the frame rail and the engine. This is required due to the heavy electrical loads imposed by the starting circuit. To ensure proper operation of the battery cables the following chart on length, gauge and materials must be strictly adhered to:

Gasoline Engines

Combined Length of Positive and Negative	
Cable Gauge	**Cable in Inches (Copper)**
4	66
2	107
0	170

Diesel Engines

Any increase in battery cable lengths, from the General Motors design, should change to 000 cable gauge.

Battery Installation

The battery and cable installation, provided by the body upfitter, must comply with the following guidelines. Non-compliance may result in a failure of the vehicle electrical component system, the shutdown of the engine, loss of backup brake system and the possibility of fire.

1. The cables must not contact any sharp edge(s), in either the normal (stored) or slid (maintenance) position (school bus application).
2. The cables must not be bent in a radius of smaller than 10 times the cable diameter. Insulation failure can occur if this happens.
3. The cable must be supported by clips spaced at a distance of not more than 450 mm, where possible. In this clipping, they shall not have a free movement that will allow rubbing on any vehicle component, either fixed or moveable.
4. All clips used must be of the rubber-lined type, not rubber dipped.
5. Do not splice the battery cables. Cable modifications can result in vehicle starting problems and loss of other key systems.
6. The cables must be clipped to the battery tray such that the cable pull loads are not transferred into the battery posts due to slide tray movement. Failure to do so can result in loose terminals, poor starting and battery failure. Battery acid leakage could result around posts not properly relieved of strain.
7. The cable attachments at the battery terminal must not cause undue strain at these connections. There should be no sharp bends in the cables adjacent to the connections. The cables should be routed down from the terminals rather than horizontally from the terminals to prevent a lever action that may loosen connections. Terminal corrosion inhibitors and other coatings should not be applied to the sealed electrical contact areas. Terminal torque of the sealed terminal shall be 10/20 N•m for side terminal batteries and 14/20 N•m for top post batteries.
8. Mounting Base (Tray):
   The tray should be of substantial material (minimum 1.75 mm thick or sufficiently reinforced) to resist flexing and cracking. The tray must provide firm, continuous support of the battery and not amplify vibration levels. There must be no protrusions or projections in the tray or mountings that would damage the battery. Cantilevered mountings are not recommended and the tray should be mounted flat so as not to aggravate electrolyte spillage or lead fatigue. A rounded lip of adequate height to ensure stiffness and retention should be provided around the perimeter of the tray. With the battery mounted in a vehicle, a static force of 22 kg applied to a 6.54 sq. cm. area at any corner should not move the battery any more than .25 mm.
9. Freedom Battery:
   The hold-down must be able to withstand a 22 G-3 millisecond shock loading and prevent the battery movement relative to the mounting base or hold-down. Torque at the battery hold-down shall be 15/20 N•m (133-177 lbs. in) at the base clamp or 2.3/4.5 N•m (20-40 lbs. in.) at the top bar. A bottom hold-down centrally located at the sides of the battery is recommended.
10. Linehaul Battery:
    A tight, secure hold-down is essential. Hold-down brackets must retain the battery at a 22 G-3 millisecond shock loading. A top hold-down should be spaced a minimum of 15 mm from terminal posts to avoid possible ground paths. If a top hold-down is used, a non-corrosive, non-conductive coating is desirable.

    Location:
    The battery should be located in a well ventilated area where a temperature build-up does not occur. The location should also provide protection to the battery to prevent damage from foreign objects. The ends of the battery in the area of the vent ports should be free of obstructions so that the gasses generated during charging can be freely dissipated into the atmosphere.
11. Vibration - Freedom Batteries:
    The mounting should not subject the battery to vibration levels in excess of an PSD of more than 0.8 G RMS for the frequency range 8 to 200 HZ in any axis when exposed to the Manufacturer's Driving Schedule. The mounted battery assembly shall not have resonant frequency lower that 50 HZ.

    Vibration - Linehaul:
    Battery(s) should not be subjected to peak vibration levels in excess of 3 Gs in any axis when exposed to the manufacturer's driving schedule. Vibration frequencies of 20 to 40 HZ will cause resonance of battery parts and should be avoided, particularly at levels above 1 G acceleration in horizontal directions. Vibration frequencies of 10 HZ or below with accompanying high displacements may cause electrolyte (acid) expulsion from the battery and should be avoided.
12. Accessibility:
    The hold-down should be convenient for tools and hands so that personal injury does not occur. There should be clearance at the insulated and grounded terminals so that wrenches can be used so that accidental grounds or shorts will not occur. Terminal polarity markings, warning labels and test hydrometer should be visible. The battery "ground" connection must be readily accessible for disconnection, as required for vehicle electrical service requirements.
13. Tilt Angles:
    For normal vehicle operation (at GVW), the battery should not be tilted (0°). For installation or removal, it should not be necessary to tip or tilt the battery in ex-

cess of 40°. This is to prevent acid spillage. For short duration vehicle shipment, do not tilt the battery more than 19° from the horizontal.

14. Temperature:
The temperature of the electrolyte should not exceed 52°C. Infrequent peak temperatures to 75°C can be tolerated in soak situations only. Shielding may be required to protect the battery from a source of excessive heat.

15. Battery Trays:
Battery trays are supplied with the chassis. In the case of motor homes and diesel school busses, the trays are secured to the frame rail (for shipping only).

    For other units, the tray is supplied on the radiator support. The trays shipped on the rails may be relocated to other areas on the vehicle, keeping in mind the recommendations noted above.

16. Battery Storage:
Today's vehicles have several electronic devices which result in very small but continuous current drains on their batteries, commonly referred to as "parasitic" loads. Vehicles that are not used for an extended period of time may develop extremely discharged and/or permanently damaged batteries resulting from these parasitic loads. Discharged batteries can freeze at temperatures as high as 20°F causing permanent damage.

    To alleviate this condition, check to make sure green dot is visible, recharge as necessary, then disconnect the negative battery cable on vehicles which are not going to be in service within a 30 day period. If this is not possible, batteries should be recharged periodically (every 30-60 days) until the green dot is visible.

NOTE: The ignition switch must be off when connecting or disconnecting battery cables or hangers (jumper cables). Failure to do so may overstress or damage the BCM/ECM/PCM/TCM, VCM or other electronic components.

Modifications/add-on wiring must be carefully reviewed to ensure compatibility with the base vehicle wiring by reviewing system schematics, wire routing paths, harness connections, etc. Due to the wide range of modifications that may be required for vocational needs, it is not feasible for the O.E.M. to take into account all potential revisions. For this reason, any person modifying existing vehicle wiring must assume responsibility that the revisions have not degraded the electrical system performance. Any add-on wiring must be properly fused and routed to prevent cut, pinch, and chafe problems, as well as avoid exposure to excessive heat. Care must be exercised that existing vehicle interfaces do not have their current load capabilities exceeded, and that the respective control devices are not overloaded. Added wire size should be at least as large as the the wire to which it is attaching in order for fuse protection to be maintained.

A Packard electric wiring repair kit is available through Kent–Moore (GM P/N 12085264, Kent–Moore P/N J38125-4). This kit contains instructions, tools and components for making repairs to wiring harness components. This kit would also greatly assist in accomplishing necessary add-on wiring such as body marker lamps, so that system reliability/durability is maintained.

Electrical wiring components can be obtained through your authorized GM dealer. Many Packard Electric components are also available through Pioneer Standard Company (1-800-PACKARD). Pioneer may also be able to assist in making necessary wiring additions by providing custom wiring stubs or jumpers to your specifications.

Fusible Link Repair Procedure

1. Cut damaged fusible link from wiring harness assembly splice.
2. Strip insulation from harness wire as required to splice on new fusible link.
3. Fabricate a new fusible link wire approximately 6 to 8 in. long from the same wire size as the original link. (Acceptable fusible link material will be imprinted with the wire size and the wording to identify it as fusible link. Fusible link cable is not the same as normal vehicle wiring.)
4. Terminate fusible link harness wire with a suitable compression splice clip, and solder with an electrical grade rosin core solder. Wrap splice area with heat shrink tubing to provide electrical insulation, as well as mechanical strain relief at the splice.
5. Strip, terminate, solder, and insulate remaining end of fusible link with appropriate termination to be compatible with the rest of the electrical system.
6. For further information, refer to the instruction manual in the wiring repair kit referenced elsewhere in this section.

NOTE: A ground stud has also been provided above the junction block.

Accessory Power Supply Feed

Power for two-way radios should be obtained directly from the battery.

Section 13 – Cooling

To provide satisfactory engine cooling, the following conditions must be met:

1. Do not locate any large objects in front of the radiator core or grille such as batteries, spare tires, lights/sirens, etc. They restrict air flow into the radiator core and influence fan blade stress.
2. Grille opening, size configuration and the external baffles provided should not be altered in any manner. Any reduction in cooling ability may adversely affect engine/transmission performance.

3. Fan clutches not conforming to the original equipment specifications may not operate correctly and may stay “on” continuously, never come on, or cycle on and off excessively. This will result in a reduction of fuel economy, engine overheat at times, and annoying cycling respectively.
4. Heavy duty cooling equipment is required when air conditioning, auxiliary belt driven equipment, snow plows, winches, etc. are installed.
5. Grille open area must not be less than 85% of radiator core frontal area. The remaining 15% less blockage must be evenly distributed.
6. Continuous coolant flow is necessary from heater connection on engine-to-heater connection on radiator to control transmission oil temperatures during closed thermostat (warm-up) operation. Do not alter this flow as it may result in premature engine or transmission failure.
7. If a heater unit is not installed in the vehicle or a heater shut-off valve is required, a line connecting the heater connection on the engine to the heater connection on the radiator must be installed. When a shut-off valve is required in heating system, it must be teed into the system in such a manner as to maintain continuous flow between engine heater connection-radiator heater connection at all times.

Do not install any internal flow restrictors.

- Heater hose:
  3-way or 4-way valves must be used to provide constant water flow through the intake manifold pad area used to mount the TBI unit.

NOTE: TBI unit does not have internal coolant passages.

- If in-line shut-off valve is used in combination with 3 way valves, shut-off valve must not be closed until 3-way valve at engine is in the proper position.

Valve	Address	Phone
3 Way	Red-White Valve Corp., Carson, CA	(213) 549-1010
	Ranco Controls Div., Delaware, OH	(614) 876-8022
4 Way	Ranco Controls Div., Delaware, OH	(614) 876-8022

WHEEL AND TIRE INFORMATION

Tire Sizes and Dimensions

SW	=	Section width
SH	=	Section height
O	=	Dish Offset
D	=	Diameter of tire and wheel
RW	=	Rim width
BW	=	Bulge width (loaded tire)
BCD	=	Bolt circle diameter
BD	=	Bore diameter
SLR	=	Static loaded radius
OAD	=	Overall diameter

Examples:

Tube Type	10.00 x 20/F		
	10.00	=	10” overall width between tire sidewalls
	20	=	20” rim diameter
	F	=	12 ply rating-load range
Tubeless	11R22.5/F		
	11	=	11” overall width between tire sidewalls
	R	=	Radial construction
	22.5	=	22.5” rim diameter
	F	=	12 ply rating-load range
Low Profile	255/75R22.5G		
	255	=	255 mm overall width between tire sidewalls
	75	=	Aspect ratio in % of section height/section width
	R	=	Radial construction
	22.5	=	22.5” rim diameter
	G	=	14 ply rating-load rating

NOTE: Overall diameter and SLR may vary between manufactures of the same size and tread code. Different tire sizes will affect road speed.

Hub Mount Wheel Offerings

Description	Minimum Load & Inflation	Option Code	Dealer Location
19.5 X 6.75 8 Hole, 275 mm B.C. Hub Piloted Disc Wheel (4 Handhole)	5000/115	Q82	Front
		Q83	Rear
22.5 x 7.50, 10 hole, 285.75 mm B.C. Hub Piloted Disc Wheel (5 Handhole)	6200/120	QH3	Front
		QH4	Rear
22.5 x 8.25, 10 Hole, 285.75 mm B.C. Hub Piloted Disc Wheel (5 Handhole)	7390/120	RPQ	Front
		RPR	Rear
22.5 x 9.00, 10 Hole, 285.75 mm B.C. Hub Piloted Disc Wheel (5 Handhole)	10,000/135	QH8	Front Only

NOTE: Ball seat (Stud Pilot) and Hub Piloted Wheels ***cannot*** be mixed (ie., Stud Pilot Front, Hub Pilot Rear).

Wheel/Axle Compatibility

All wheels are compatible with existing brakes. Disc type wheels are standard. Cast spoke wheels are optional. Wheel rating equals or exceeds maximum rating of the tire that is mounted.

Disc Wheels		
Offering	**Hub Pilot**	**Stud Pilot**
No. of Studs	8, 10	10
Bolt Circle Diameter	275 mm, 285.75 mm	11.25” (285.75 mm)
Stud Size	20 mm, 26 mm	Inch size
Stud Thread Rotation	RH	RH/LH
Mounting Nut Type	Flange	Ball seat
Pilot Type	Hub	Ball seat
Wheel Size – 19.5	X	
20.0	X	X
22.5	X	X

Disc Wheel Usage				
	Axle in Pounds	**Brake Usage**	**8 Stud (275 mm)**	**10 Stud (11.25 mm)**
Front	8100	Hydraulic	X	X
		Air		X
	11,000	Hydraulic		X
		Air		X
	12,000 (SEO)	Hydraulic		X
		Air		X
	14,600	Air		X
	16,000	Air		X
Rear	15,000	Hydraulic	X	
	19,000	Hydraulic	X	X
		Air		X
	21,000	Hydraulic		X
		Air		X
	23,000	Air		X
Tandem	All	Air		X

Tire Information:

The following tires have limitations imposed by the tire manufactures. These limits have to do with speed restrictions and sustained driving distances. The tire restrictions are as follows:

Manufacturer	RPO	Tread Size Ply (Front/Rear)	Tread Code Front/Rear	RPO Note
Michelin PXZA1	R4L	315/80R22.5 J18	R3C	YWN[3)]
Goodyear G286	R4A	385/65R22.5 J18	R3F	XSP[2)]
Bridgestone Z LUG	S4N	10.00-20 F12	S3E	YUI[1)]

1) Maximum speed 55 mph
2) Maximum speed 60 mph
3) Maximum speed 65 mph

NOTE: All tires supplied by manufacturers (except those noted above) are speed restricted to 75 mph. Refer to Tire & Rim Association or Michelin recommendations for inflation and/or load limits at elevated speeds.

ProSTEEL Wheel Specifications

Wheel Size	(RPO) Option		Mfg.	Offset	Disc Thick	Rim Type	BC Dia.	No. Studs	Mounting		Bias/Radial Rating Lbs. @ Psi	Side Ring	Lock Ring
	Front	Rear							Front	Rear			
22.5 x 8.25	QM3	QM4	Accuride	6.62	.437	DCT	285.75 mm	10	Hub Pilot Front 10	Hub Pilot Rear 10	7300 @ 120	None	None

ACCURIDE ProSTEEL 10 Hole Hub Pilot Wheel

ProSTEEL is a steel wheel with the appearance of an aluminum wheel. The wheel has an advanced coating which includes a zinc phosphate pre-treat, epoxy E-coat, color coat, and a clear powder topcoat and provides maximum protection against scratching, chipping, corrosion, and chemicals.

NOTE: The inner rear wheels are painted steel wheels not ProSTEEL wheels.

Steel Disc & Rim Specifications

Wheel Size	(RPO) Option		Mfg.	Offset	Disc Thick	Rim Type	BC Dia.	No. Studs	Mounting		Bias/Radial Rating Lbs. @ Psi	Side Ring	Lock Ring
	Front	Rear							Front	Rear			
19.5 x 6.75	Q82	Q83	Accuride	5.60	.437	DCT	275 mm	8	Hub Pilot Front 8	Hub Pilot Rear 8	5000 @ 115	None	None
19.5 x 6.75	Q82 & PVA	Q83 & PVA	Accuride	5.60	.437	DCT	275 mm	8	Hub Pilot Front 8	Hub Pilot Rear 8	5000 @ 115	None	None
22.5 x 7.5	RLE	RLF	Accuride	6.44	.375	DCT	11.25	10	Ball Seat Front 10	Ball Seat Rear 10	6610 @ 120	None	None
22.5 x 7.5	RLE & PVA	RLF & PVA	Accuride	6.44	.375	DCT	11.25	10	Ball Seat Front 10	Ball Seat Rear 10	6610 @ 120	None	None
22.5 x 7.5	QH3	QH4	Accuride	6.44	.375	DCT	285.75 mm	10	Hub Pilot Front 10	Hub Pilot Rear 10	6610 @ 120	None	None
22.5 x 8.25	RRS	RRT	Accuride	6.62	.437	DCT	11.25	10	Ball Seat Front 10	Ball Seat Rear 10	7250 @ 120	None	None
22.5 x 8.25	RRS & PVA	RPT & PVA	Accuride	6.62	.437	DCT	11.25	10	Ball Seat Front 10	Ball Seat Rear 10	7300 @ 120	None	None
22.5 x 8.25	RPF		Accuride	6.62	.472	DCT	11.25	10	Ball Seat Front 10	Ball Seat Rear 10	7500 @ 120	None	None
22.5 x 8.25	RPQ	RPR	Accuride	6.62	.437	DCT	285.75 mm	10	Hub Pilot Front 10	Hub Pilot Rear 10	7390 @ 120	None	None
22.5 x 8.25	RPQ & PVA	RPR & PVA	Accuride	6.62	.437	DCT	285.75 mm	10	Hub Pilot Front 10	Hub Pilot Rear 10	7390 @ 120	None	None
22.5 x 9.0	QA5		Accuride	7.00	.625	BC	11.25	10	Ball Seat Front 10		9000 @ 130	None	None
22.5 x 9.0	QH8		Accuride	5.75	.500	BC	285.75 mm	10	Hub Pilot Front 10		10000 @ 130	None	None

RPO PVA: Wheel is pre-painted white.

Aluminum Disc Rim Specifications

Wheel Size	(RPO) Option		Mfg.	Offset	Disc Thick	Rim Type	BC Dia.	No. Studs	Mounting		Bias/Radial Rating Lbs. @ Psi
	Front	Rear							Front	Rear	
19.5 x 6.75	RPM & YU8		Alcoa	5.551	.827	DCT	285.75mm	8	Hub Pilot Front 8		5500 @ 140
19.5 x 6.75		RPW & PNB Inner	Accuride Steel Disc	5.60	.437	DCT	275mm	8		Hub Pilot Rear 8	5000 @ 115
19.5 x 6.75		RPW & PNB Outer	Alcoa	5.55	.827	DCT	275mm	8		Hub Pilot Rear 8	5500 @ 115
22.5 x 8.25	RHE &YU8		AKW	6.59	.827	DCT	11.25”	10	Hub Piolet Front 10		7300 @ 120
22.5 x 8.25		RNE & PNB	AKW	6.59	.827	DCT	11.25”	10		Hub Piolet Rear 10	7300 @ 120
22.5 x 8.25	RPU	RPV	Accuride	6.59	.935	DCT	11.25”	10	Ball Seat Front 10	Ball Seat Rear 10	7300 @ 120
22.5 x 8.25	RPU & YU8		Accuride	6.59	.935	DCT	11.25”	10	Ball Seat Front 10		7300 @ 120
22.5 x 8.25		RPV & PNB	Alcoa	6.59	.935	DCT	11.25”	10		Ball Seat Rear 10	7300 @ 120
22.5 x 7.50	RPS	RPT	Accuride	6.45	.935	DCT	11.25”	10	Ball Seat Front 10	Ball Seat Rear 10	7200 @ 120
22.5 x 7.50	RPS & YU8		Accuride	6.45	.935	DCT	11.25”	10	Ball Seat Front 10		7200 @ 120
22.5 x 7.50		RPT & PNB	Accuride	6.45	.935	DCT	11.25”	10		Ball Seat Rear 10	7300 @ 120

AKW: Is an Accuride/Kaiser Partnership aluminum wheel.
RPO RPW: Is a steel disc inner wheel same as Q83, painted gray.
RPO PNB: Both inner and outer rear wheels are aluminum and polished on both sides.
RPO YU8: Aluminum front wheel polished one side. (except RPM which is polished both sides and priced accordingly)

Recommended Spacing of Dual Rear Wheels Bias Tires

Tire Size	Tire Radius		Tire Section Grown Width	Tire Clearance Min. Design*	Recommended Chain Clearance	Design Rim Width
	Loaded	Unloaded				
8-19.5	16.5	17.59	8.72	.48	1.50	6.00
8-22.5	17.6	19.09	8.72	.48	1.65	6.00
9-22.5	18.3	19.92	9.81	.49	1.65	6.75
10-22.5	19.2	20.86	10.90	.50	1.65	7.50
11-22.5	19.8	21.60	11.99	.61	1.65	8.25

NOTE: In the chart above, tire section widths are based on given design rim widths. New tire section widths will change by 0.10 inches for each 0.25 change in rim width.

NOTE: When tires or rims other than factory installed are considered, the factory should be consulted to insure that capacities of other equipment including axles, springs, brakes, and wheel/rim equipment are not exceeded.

* Recommended minimum clearance between dual tires.

Radial Tires

Tire Size	Tire Radius		Tire Section Grown Width	Tire Clearance Min. Design*	Recommended Chain Clearance	Design Rim Width
	Loaded	Unloaded				
8R19.5	16.2	17.25	8.64	.56	1.50	6.00
8R22.5	17.3	18.75	8.64	.56	1.65	6.00
9R22.5	18.0	19.05	9.72	.58	1.65	6.75
10R22.5	18.7	20.45	10.80	.60	1.65	7.50
11R22.5	19.4	21.17	11.88	.72	1.65	8.25

Size Compatibility Chart

Tube Type	Low Pro Tube Type	Tubeless	Lo Pro 80 Series (Michelin)	Lo Pro 75 Series (Goodyear)	Ultra Lo Pro
		8R19.5			225/70R19.5
7.50R20		8R22.5			245/70R19.5
8.25R20		9R22.5	235/80R22.5	245/75R22.5	245/70R19.5
9.00R20		10R22.5	255/80R22.5	265/75R22.5	
9.00R20	10/90R20	10R22.5			255/70R22.5
10.00R20		11R22.5	275/80R22.5	295/75R22.5	
10.00R20		11R22.5	275/80R22.5		
11.00R20		12R22.5	295/80R22.5		
			315/80R22.5		

NOTE: Chart shows comparable sizes, not equal sizes. Check specific dimensions and load capabilities before replacing one tire size with another.

Michelin Tires

Tire Tread Name: XZE

Description: The regional short haul all wheel position radial designed to deliver longer original mileage with unusually deep tread and robust ribs.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3B/S3B	XUE/YUE	9R22.5	F/12	10.0”	8.9”	38.2”		17.8”		542		95	95	4540	4300
R3B/S3B	XWJ/YWJ	10R22.5	F/12	11.5”	10.2”	40.1”		18.7”		518		95	95	5150	4740
R3B/S3B	XWK/YWK	10R22.5	G/14	11.5”	10.2”	40.1”		18.7”		518		105	105	5680	5080
R3B/S3B	XWL/YWL	11R22.5	G/14	12.4”	10.6”	41.1”		19.3”		497		100	100	6175	5675
R3B/S3B	XWM/YWM	11R22.5	H/16	12.4”	10.6”	41.1”		19.3”		497		115	115	6610	5950
R3B/S3B	XTI/YTI	245/70R19.5	F/12	10.9”	8.9”	33.5”		15.1”		621		90	90	4080	3860
R3B/S3B	XTY/YTY	245/70R19.5	G/14	10.9”	8.9”	33.5”		15.1”		621		110	110	4805	4540
R3B/S3B	XSH/YSH	275/80R22.5	G/14	12.4”	11.1”	39.7”		18.4”		516		100	100	6175	5675
R3B/S3B	XRL/YRL	235/80R22.5	G/14	10.5”	9.4”	37.4”	10.2”	17.4”	60.0	556	81	90	90	4675	4410
R3B/S3B	XSB/YSB	255/80R22.5	G/14	11.4”	10.0”	38.5”	11.0”	17.9”	66.6	542	94	95	95	5205	4810
R3B/S3B	XWP/YWP	12R22.5	H/16	12.9”	11.4”	42.6”	12.3”	19.8”	76.1	486	138	115	115	7390	6750
R3C/S3C	XTB/YTB	255/70R22.5	H/16	11.1”	9.8”	36.7”	10.7”	17.0”	58.9	565	87	115	115	5100	5070

Tire Tread Name: PXZA

Description: Low profile all-wheel position, highway radial truck tire.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C/S3C	XTN/YTN	225/70R19.5	F/12	9.9”	8.8”	32.3”	9.6”	14.9”	52.4	647	57	85	85	3640	3415
R3C	XSK	295/80R22.5	H/16	13.3”	11.7”	41.5”	12.9”	19.3”	75.3	500	129	100	115	6175	6610

Tire Tread Name: XZA2

Description: The radial truck tire optimized for steer axles in line-haul operation, with the versatility for all-wheel position use. The tire also is dramatically improved for much lower rolling resistance which improves fuel economy.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C/S3C	XWL/YWL	11R22.5	G/14	12.5”	11.1”	41.3”	12.0”	19.3”	70.1	501	116	100	105	6175	5080
R3C/S3C	XSH/YSH	275/80R22.5	G/14	12.3”	10.9”	40.0”	12.0”	18.6”	84.6	518	110	100	100	6175	5675
R3C/S3C	XWM/YWM	11R22.5	H/16	12.5”	11.1”	41.3”	12.0”	19.3”	70.0	501	118	115	115	6610	5950

Tire Tread Name: PXDU

Description: A low profile traction, drive-axle radial for urban use.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3D	YRL	235/80R22.5	G/14	10.4”	9.3”	37.4”	10.2”	17.4”	60.0	554	83	90	90	4675	4410
S3D	YSB	255/80R22.5	G/14	11.3”	10.0”	38.4”	10.9”	17.8”	66.0	540	92	95	95	5205	4810

Tire Tread Name: XDA2

Description: The drive-axle highway radial especially designed for long, even wear on line-haul 6x4 tractors. The tire also is dramatically improved for much lower rolling resistance which improves fuel economy.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3D	YSH	275/80R22.5	G/14	12.2”	10.9”	40.7”	11.9”	18.9”	69.8	514	119	100	100	6175	5675
S3D	YWL	11R22.5	G/14	12.5”	11.1”	41.9”	11.9”	19.5”	75.9	499	125	100	105	6175	5080

Tire Tread Name: XD2

Description: The drive-axle highway radial especially designed for long, even wear on line-haul 6x4 tractors. The tire also is dramatically improved for much lower rolling resistance which improves fuel economy.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3D	YTB	255/70R22.5	H/16	11.1”	9.6”	36.9”	10.6”	17.3”	60.6	561	98	115	115	5510	5070

Tire Tread Name: PXZT

Description: The low profile drive-axle traction radial with mud and snow capabilities.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3D	YTN	225/70R19.5	F/12	9.9”	8.8”	32.5”	9.6”	15.0”	53.3	639	57	85	85	3640	3415
S3D	YTY	245/70R19.5	G/14	10.9”	9.7”	33.6”	10.5”	15.6”	55.9	618	72	110	110	4805	4540

Tire Tread Name: XDE A/T

Description: The deep tread, high traction drive tire designed to perform in highway and off road conditions.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3E/S3E	XWP/YWP	12R22.5	H/16	13.0”	11.3”	43.0”		19.8”		486		115	115	7390	6750

Tire Tread Name: XDY-1

Description: The traction directional drive-axle radial truck tire, delivering a new level of balance between traction, mileage, even wear and rolling resistance with versatility for on/off road use.*

Michelin Code: S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3T	YWL	11R22.5	G/14	12.8”	11.3”	42.0”	12.5”	19.6”	84.0	493	138	100	105	6175	5080
S3T	YWM	11R22.5	H/16	12.8”	11.3”	42.0”	12.4”	19.6”	83.0	493	138	115	115	6610	5850

* Contact Sales Engineering for wheelbase restrictions due to tire tread depth.

Tire Tread Name: XDHT

Description: The drive axle highway radial truck tire that balances long mileage with all-season traction, optimized for high torque applications, like single axle 4x2s.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3H	YWL	11R22.5	G /14	12.6”	11.1”	41.9”	12.0”	19.5”	78.0	500	125	100	105	6175	5080

Tire Tread Name: PXDHT

Description: The low profile drive axle highway radial truck tire that balances long mileage with all-season traction, optimized for high torque applications, like single axle 4x2s.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3H	YSH	275/80R22.5	G /14	12.2”	10.9”	40.7”	12.0”	18.9”	77.3	515	130	100	100	6175	5675

Tire Tread Name: XM+S4

Description: The drive-axle highway radial truck tire with Michelin's most aggressive tread built for maximum traction in mud and snow.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3J	YUE	9R22.5	F/12	9.8”	8.6”	37.9”	9.6”	17.6”	58.4	548	82	95	95	4540	4300
S3J	YWK	10R22.5	G/14	10.8”	10.8”	40.2”	10.5”	18.6”	68.0	519	101	105	105	5680	5080
S3J	YWL	11R22.5	G/14	11.1”	11.1”	41.7”	12.1”	19.4”	80.0	499	120	105	100	6175	5080
S3J	YWM	11R22.5	H/16	12.2”	11.2”	41.8”	12.1”	19.4”	79.8	500	121	115	115	6610	5950
S3J	YWJ	10R22.5	F/12	10.8”	10.8”	40.2”	10.5”	18.6”	68.0	517	98	95	95	5150	4740

Tire Tread Name: PXM+S4

Description: The low profile drive-axle highway radial truck tire with Michelin's most aggressive tread built for maximum traction in mud and snow.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3J	YSH	275/80R22.5	G/14	12.3”	11.0”	40.4”	12.0”	18.8”	73.0	516	112	100	100	6175	5675

Tire Tread Name: XZY-1

Description: The low-profile all-wheel-position radial truck tire for on/off road use designed primarily for steering-axle use.

Michelin Code: R4L/S4L

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3K/S3K	XWL/YWL	11R22.5	G/14	12.8”	11.3”	41.6”	12.5”	19.5”	81.0	497	126	100	105	6175	5080
R3K/S3K	XWM/YWM	11R22.5	H/16	12.8”	11.3”	41.6”	12.5”	19.5”	77.0	497	134	115	115	6610	5800
R3K/S3K	XWP/YWP	12R22.5	H/16	12.8”	11.3”	42.6”	12.5”	19.8”		486	146	115	115	7390	6610

Goodyear Radial Tires

Tire Tread Name: G291

Description: A rib tire design with traction qualities that permit all-position use.
Application: All-position tire for metro service application.

Goodyear Code: R4A/S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C	XWN	315/80R22.5	J/18	13.8”	12.4”	42.3”	13.5”	19.7”		491	140	120	120	8270	7610

Tire Tread Name: G159

Description: A steel-belt casing, construction ribbed tire designed for commercial applications when added strength and durability are needed.
Application: Fast rate of wear steer axles and all-position service.

Goodyear Code: R4A/S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C/S3C	XTI/YTI	245/70R19.5	F/12	11.0”	9.9”	33.0”	10.9”	15.3”	53	629	74	95	95	4080	3860
R3C/S3C	XTY/YTY	245/70R19.5	G/14	11.0”	9.9”	33.0”	10.9”	15.3”	53	628	74	100	110	4545	4300
R3C/S3C	XWL/YWL	11R22.5	G/14	12.6”	10.9”	41.5”	12.0”	19.4”	70	501	118	105	115	6175	5250
R3C/S3C	XWM/YWM	11R22.5	H/16	12.6”	10.9”	41.5”	12.0”	19.4”	70	501	128	120	110	6610	5800
R3C/S3C	XTQ/YTQ	245/75R22.5	G/14	11.0”	9.5”	37.0”	10.4”	17.2”	54	561	88	110	100	4675	4300
R3C/S3C	XTU/YTU	265/75R22.5	G/14	11.6”	9.9”	38.7”	10.8”	18.0”	61	537	96	110	100	5205	4805
R3C/S3C	XRN/YRN	295/75R22.5	G/14	12.9”	11.2”	40.4”	12.3”	18.7”	69	514	118	110	100	6175	5675
R3C/S3C	XTB/YTB	255/70R22.5	H/16	11.3”	9.8”	36.4”	10.7”	17.0”	55	571	90	120	115	5510	5070
R3C/S3C	XWJ/YWJ	10R22.5	F/12	11.4”	10.1”	40.1”	11.0”	18.8”	63	518	105	100	100	5150	4875
R3C/S3C	XWP/YWP	12R22.5	H/16	13.5”	11.5”	42.7”	12.7”	19.9”	75	486	152	120	120	7390	6750
R3C/S3C	XWK/YWK	10R22.5	G/14	11.4”	10.1”	40.1”	11.0”	18.8”	63	518	107	115	105	5250	4970
R3C/S3C	XUE/YUE	9R22.5	F/12	10.3”	9.0”	38.4”	9.9”	18.0”	52	541	94	105	95	4500	3950
R3C	XRV	285/75R24.5	G/14	12.5”	10.9”	41.3”	11.9”	19.4”	69	503	118	110	100	6175	5675

Tire Tread Name: G124

Description: All-season type drive tire developed for maximum traction and tread life under a variety of conditions. Application: Metro and line-haul service, single screw tractors or trucks.

Goodyear Code: S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3H	YTI	245/70R19.5	F/12	11.0”	9.9”	33.2”	10.9”	15.4”	55	622	95	95	85	4080	3875
S3H	YTY	245/70R19.5	G/14	11.0”	9.9”	33.2”	10.9”	15.4”	55	622	110	110	100	4540	4375
S3H	YTU	265/75R22.5	G/14	11.6”	9.9”	38.7”	11.1”	18.2”	63	537	95	110	100	5205	4805
S3H	YTQ	245/75R22.5	G/14	11.0”	9.5”	37.3”	10.5”	17.4”	56	557	90	110	110	4675	4410
S3H	YWL	11R22.5	G/14	12.6”	10.8”	41.7”	11.9”	19.5”	73	498	123	105	115	6175	5250
S3H	YWM	11R22.5	H/16	12.6”	10.8”	41.7”	11.9”	19.5”	73	498	129	120	110	6610	5800
S3H	YRN	295/75R22.5	G/14	12.9”	11.1”	40.6”	12.3”	18.9”	71	512	112	110	100	6175	5675
S3H	YTB	255/70R22.5	H/16	11.3”	9.8”	36.8”	10.7”	17.2”	53	564	92	115	115	5510	5070
S3H	YWK	10R22.5	G/14	11.4”	10.0”	40.4”	11.0”	19.0”	67	514	108	115	105	5250	4970
S3H	YWJ	10R22.5	F/12	11.4”	10.0”	40.4”	11.0”	19.0”	67	514	108	100	100	5150	4875
S3H	YWP	12R22.5	H/16	13.5”	11.2”	43.1”	12.4”	20.2”	78	482	151	120	120	7390	6720
S3H	YUE	9R22.5	F/12	10.3”	9.0”	38.6”	9.9”	18.1”	53	538	91	105	95	4500	3950
S3H	YRV	285/75R24.5	G/14	12.5”	10.6”	41.8”	11.9”	19.6”	71	497	117	110	100	6175	5675

Tire Tread Name: G167

Description: The Unisteel G167 rates high in mileage, fuel savings, retreadability and low in tire down time loss. Application: Twin screw tractors or single drive axle service with little need for extra traction.

Goodyear Code: S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3D	YWJ	10R22.5	F/12	11.4”	9.9”	40.7”	10.9”	19.1”	65	513	114	100	100	5150	4875
S3D	YWL	11R22.5	G/14	12.6”	10.7”	42.0”	11.8”	19.7”	73	497	130	105	115	6175	5250
S3D	YWM	11R22.5	H/16	12.6”	10.7”	42.0”	11.8”	19.7”	73	497	137	120	110	6610	5800
S3D	YWP	12R22.5	H/16	13.5”	11.5”	43.2”	12.7”	20.2”	80	483	150	120	120	7390	6750
S3D	YRN	295/75R22.5	G/14	12.9”	10.9”	40.8”	11.9”	19.0”	68	512	120	110	100	6175	5675
S3D	YRV	285/75R24.5	G/14	12.5”	10.5”	42.1”	11.4”	19.7”	74	496	124	110	100	6175	5675

Tire Tread Name: G144

Description: Mixed service high-speed radial truck tire for on/off road applications.

Goodyear Code: S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded					Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)							
S3E	YWL	11R22.5	G/14	12.6”	10.8”	41.7”	11.9”	19.5”	74	498	124	105	115	6175	5250
S3E	YWM	11R22.5	H/16	12.6”	10.8”	41.7”	11.9”	19.5”	74	498	132	120	110	6610	5800

Tire Tread Name: G286

Description: For rigorous service as encountered in logging, oil field use, mining areas, and waste haulers. This tire features a 4 rib design and is chip-chunk-cut resistant. Application: Mainly off-the-highway with some over-the-highway service.

Goodyear Code: R4A/S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded					Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)							
R3F/S3F	XWL/YWL	11R22.5	G/14	12.6”	10.8”	41.7”	11.9”	19.5”	78	496	126	105	115	6040	5250
R3F/S3F	XWP/YWP	12R22.5	H/16	13.5”	11.4”	43.0”	12.5”	20.0”	81	483	146	120	120	7390	6720
R3F[1)]	XSP	385/65R22.5	J/16	—	14.9”	42.4”	15.9”	19.5”	95	490	181	120	—	9370	—
R3F/S3F	XWM/YWM	11R22.5	H/16	12.6”	11.0”	41.8”	12.1”	19.5”	W/A	W/A	W/A	120	110	6610	5800

[1)] Maximum speed 60 mph.

Tire Tread Name: G186

Description: All-position radial truck tire for on/off road service. Wide, flat tread for even wear and long mileage. Application: Mainly over-the-highway with some off-the-highway service.

Goodyear Code: R4A/S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3K/S3K	XWJ/YWJ	10R22.5	F/12	11.4”	10.0”	40.4”	11.0”	18.9”	64	514	112	100	100	5150	4875
R3K/S3K	XWL/YWL	11R22.5	G/14	12.6”	11.0”	41.8”	12.1”	19.5”	70	497	121	105	115	6040	5250
R3K/S3K	XWM/YWM	11R22.5	H/16	12.6”	11.0”	41.8”	12.1”	19.5”	70	497	129	120	110	6610	5800

Tire Tread Name: G177

Description: Severe service drive axle radial designed for rugged off-road conditions. Excellent off-road traction and durability.

Goodyear Code: R4A/S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3L/S3L	XWL/YWL	11R22.5	G/14	12.5”	10.9”	42.3”	12.0”	19.7”	75	493	138	105	115	6040	5250
R3L/S3L	XWM/YWM	11R22.5	H/16	12.5”	10.9”	42.3”	12.0”	19.7”	75	493	145	120	110	6610	5800
R3L/S3L	XWP/YWP	12R22.5	H/16	13.5”	11.2”	43.7”	12.3”	20.5”	85	478	160	120	120	7390	6720

Tire Tread Name: G357

Description: High mileage steer tire. Computer-aided tread design for reduced cupping and more even wear. Aggressive five-rib tread design delivers all-weather traction. Recessed Pressure Distribution Groove equalizes footprint pressure, reduces tear and stone holding.

Goodyear Code: R4A/S4A

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3N	XWL	11R22.5	G/14	12.5”	10.9”	41.3”	11.9”	19.4”	70	503	120	105	105	6175	5750

General Radial Tires

Tire Tread Name: Ameri-Steel-A-Tread

Description: An all-position, steel-belted radial truck tire that offers excellent tread wear.

General Code: R4H/S4H

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3B/S3B	XWL/YWL	11R22.5	G/14	12.6”	10.8”	41.3”	12.2”	19.2”		501	123	105	105	6040	4970
R3B/S3B	XWJ/YWJ	10R22.5	F/12	11.4”	10.0”	40.3”	11.3”	18.7”		514	100	100	90	5150	4520

Tire Tread Name: Ameri-Steel-D-Tread

Description: An all-position, steel-belted radial truck tire that offers excellent tread wear.

General Code: R4H/S4H

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3B/S3B	XUE/YUE	9R22.5	F/12	10.3”	9.1”	38.2”	10.3”	17.9”		542	79	105	95	4500	3950
R3B	XWP	12R22.5	H/16	13.5”	11.9”	42.7”	13.3”	19.8”		485	147	120		7200	

Tire Tread Name: Ameri-S380

Description: Premium low profile radial truck tire optimized for steer axles, built for long mileage and retreadability, with versatility for all wheel position use.

General Code: R4H/S4H

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C	XRN	295/75R22.5	G/14	13.2”	11.1”	40.2”	12.0”	18.7”		515	124.8	110		6175	
R3C/S3C	XWL/YWL	11R22.5	G/14	12.6”	11.0”	41.4”	12.0”	19.3”		500	128.0	105	95	6040	4970

Tire Tread Name: Ameri-S370

Description: Tread compound is specially formulated to provide high mileage for on-highway driving, and resists cuts and tears in off-road use. Visual Alignment Indicators (VAI) aid in early detection of tire tracking problems. Stone Guard System reduces stone retention for casing durability and offers multiple retreading.

General Code: R4H/S4H

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3F	XWM	11R22.5	H	12.5”	11.1”	41.4”	12.0”	19.3”		500	119.0	120	110	6610	5800

Tire Tread Name: Ameri-Lug B–Tread

Description: A drive position highway lug tire developed for maximum traction and tread life under a variety of conditions.

General Code: R4H/S4H

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3D	YWJ	10R22.5	F/12	11.4”	10.0”	40.3”	11.3”	18.7”		511	106	95	90	5150	4520

Tire Tread Name: Ameri-MSL Radial H–Tread

Description: An all-wheel-position multi-service tire engineered for on or off highway service.

General Code: R4H/S4H

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3K/S3K	XWP/YWP	12R22.5	H/16	13.0”	11.3”	42.8”	12.8”	19.6”		484	147	120	110	7200	6320
R3K/S3K	XWM/YWM	11R22.5	H/16	12.6”	10.7”	41.4”	12.2”	19.3”		500	134	120	110	6610	5800

Bridgestone Radial Tires

Tire Tread Name: R250F (With Side Wall Protector Rib)

Description: This 5 rib all position radial is designed for high scrub applications. The R250F tires feature sidewall protector ribs for cut and abrasion resistance.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3B/S3B	XRN/YRN	295/75R22.5	G/14	13.2”	10.9”	40.2”	12.0”	18.8”		519	119	110	100	6175	5675
R3B/S3B	XUE/YUE	9R22.5	F/12	10.3”	8.9”	38.3”	9.7”	18.0”		542	91.9	105	95	4500	3950
R3B/S3B	XWY/YWJ	10R22.5	F/12	11.4”	9.8”	40.0”	10.7”	18.7”		519	107.1	100	90	5150	4520
R3B/S3B	XWL/YWL	11R22.5	G/14	12.6”	10.7”	41.3”	11.8”	19.3”		502	120.3	105	105	6040	4970
R3B/S3B	XWP/YWP	12R22.5	H/16	13.5”	11.6”	42.7”	12.6”	19.8”		487	109.3	120	110	7200	6610
R3B/S3B	XTQ/YTQ	245/75R22.5	G/14	11.0”	9.7”	37.4”	10.5”	17.6”		555	88.7	110	100	4675	4300
R3B/S3B	XTU/YTU	265/75R22.5	G/14	11.6”	10.2”	38.4”	11.1”	18.0”		541	95.9	110	100	5205	4805

Tire Tread Name: R293

Description: Defense groove design for resistance to irregular wear on steering axle positions for on-highway applications. This tire can also be used in drive and trailer positions.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C/S3C	XWL/YWL	11R22.5	G/14	12.6”	10.6”	41.3”	11.7”	19.3”		519	117.4	105	105	6175	5750

Tire Tread Name: R294–LP

Description: This low profile, all-position radial features the exclusive “NS” compound for improved resistance and wire chafer bead construction.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C/S3C	XTB/YTB	255/70R22.5	H/16	11.5”	9.9”	36.7”	10.9”	17.4”	52.0	568	99.4	120	115	5510	5070

Tire Tread Name: R299–LP

Description: This low profile, all-position radial provides the Defense Groove for improved irregular wear resistance. This model is intended for steer axle applications.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3C/S3C	XRN/YRN	295/75R22.5	G/14	13.2”	10.9”	40.2”	12.0”	18.8”	69.7	526	118.7	110	100	6175	5675
S3C	YRV	285/75R24.5	G/14	12.5”	10.6”	41.4”	11.7”	19.4”		499	117	110	100	6175	5675

Tire Tread Name: M711

Description: This deep tread, drive-axle radial has a cap/base construction and an aggressive traction pattern. The 26/32” tread depth is for improved mileage.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3D	YWL	11R22.5	G/14	12.6”	10.7”	41.9”	11.8”	19.7”	71.0	498	132.9	105	105	6175	4970
S3D	YRN	295/75R22.5	G/14	13.2”	11.1”	40.6”	12.2”	19.1”	70.1	513	123.6	110	100	6175	5675
S3D	YRV	285/75R24.5	G/14	12.5”	10.6”	41.9”	11.7”	19.7”		499	123.6	110	100	6175	5675

Tire Tread Name: M716

Description: This standard tread, drive-axle radial features an aggressive traction pattern and 22/32” tread depth for improved fuel economy and lighter weight.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3J	YTU	265/75R22.5	G/14	11.6”	10.1”	38.6”	11.1”	18.2”		541	101.2	110	100	5205	4805
S3J	YRV	285/75R24.5	G/14	12.5”	10.6”	41.6”	11.7”	19.7”		499	117	110	100	6175	5675

Tire Tread Name: M716F

Description: This standard tread, drive-axle radial features an aggressive traction pattern and 22/32” tread depth for improved fuel economy and lighter weight as well as side wall protector ribs for protection against cuts and abrasions.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
S3J	YRN	295/75R22.5	G/14	13.2”	11.1”	40.4”	12.2”	19.1”		519	117.1	110	100	6175	5675

Tire Tread Name: M724

Description: An all-position, all-season design with sidewall protector ribs for resistance to cuts and abrasions.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3M/S3M	XTY/YTY	245/70R19.5	G/14	11.1”	9.7”	33.5”	10.4”	15.7”		622	79.6	110	110	4540	4375

MEDIUM DUTY C & T SERIES

Tire Tread Name: M857

Description: The M857 is a mixed service all-position radial. The rib/lug pattern enables it to be used in steer, drive and trailer axles.

Bridgestone Code: R4N/S4N

Tread Code	RPO	Size	Load Range/Ply Rating	Min. Spacing of Duals	Dimensions				Gross Contact Area (Sq. In.)	Revs Per Mile	Tire Weight (Lbs.)	Max. Pressure		Max. Load	
					No Load		Loaded								
					Width (In.)	Dia. (In.)	Width (In.)	SLR (In.)				Single (PSI.)	Dual (PSI.)	Single (Lbs.)	Dual (Lbs.)
R3K/S3K	XWK/YWK	10R22.5	G/14	11.4”	9.8”	40.3”	10.8”	19.0”		519	111.3	115	105	5680	4970

PROPELLER SHAFTS

U-Joint Series	Tube Diameter (Outside) & Thickness (Inside)	
	Metric	English
JQB 1480	88.9 x 2.11	3.50 x 0.083
JQP 1550	88.9 x 2.41	3.50 x 0.095
JQR 1610	88.9 x 3.40	3.50 x 0.134
JQM 1710	101.6 x 3.40	4.00 x 0.134
JQQ 1710HD	101.6 x 3.40 DOM	4.00 x 0.134 DOM
JXD 1760HD	103.9 x 4.57	4.09 x 0.180

N/A = Not available RPO driveline combination
Manual–Low gear torque = net engine torque (x) low gear (x) transmission efficiency
Automatic–Low gear torque = net engine torque (x) low gear (x) transmission efficiency (x) torque converter stall ratio
Transmission efficiency = 90% manual, 85% automatic

Gas Engines

Engine 7.4L V8 Option LP4			210 Net HP @ 3750 RPM 325 lb. ft. of Torque @ 2400 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MF1	AT545	6.76	N/A	1480*
ME4	MT643G	11.06	N/A	1610
ME6	MT653DRG	24.84	N/A	1610
MSC	FS4205B	6.99	N/A	1480*
MSG	FS4205A	8.05	N/A	1550
MT9	AT542	6.07	N/A	1480*
MMO	FS5306	9.01	N/A	1550

* With 23,000 lb. capacity rear axle joint series is upgraded to 1550

Engine 7.4L V8 Option L21			270 HP @ 3750 RPM 390 lb. ft. Torque @ 3200 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME4	MT643G	11.06	1610	1610
ME6	MT653DRG	24.84	1710HD	1610
MF1	AT545	6.76	N/A	1550
MMO	FS5306A	9.01	1610	1550
MNC	FS5205B	6.82	1550	1550
MPU	FS5205A	7.52	1550	1550
MSC	FS4205B	6.99	1550	1550
MSG	FS4205A	8.05	N/A	1610
MT9	AT542	6.07	N/A	1550

Diesel Engines

Engine			170 GHP @ 2600 RPM 420 lb. ft. Gross Torque @ 1560 RPM	
6.6L Diesel Cat. '3116'.Option LVR				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	N/A	1610
ME5	MT653DRD	18.09	N/A	1710
MF1	AT545	6.76	N/A	1550
MK8	ES052-7B	10.09	N/A	1610
MMO	FS5306A	9.01	N/A	1610
MNC	FS5205B	6.82	N/A	1550
MNK/MP8	MD3060P	3.49	N/A	1610
MPU	FS5205A	7.52	N/A	1610
MSC	FS4205B	6.99	N/A	1550
MSG	FS4205A	8.05	N/A	1610
MT9	AT542	6.07	N/A	1550
MWO	FS6206	9.01	N/A	1710

Engine			LVX-185 GHP @ 2600 RPM LVT-195 GHP @ 2600 RPM LVS-200 GHP @ 2600 RPM 520 lb. ft. Gross Torque @ 1560 RPM Manual 495 lb. ft. Gross Torque @ 1560 RPM Auto.	
6.6L Diesel Cat '3116' Option LVX/LVS/LVT				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	N/A	1610
ME5	MT653DRD	18.09	N/A	1710
MF1	AT545	6.76	N/A	1610
MK8	ES052-7B	10.09	N/A	1610
MK9	ES066-7B	7.48	N/A	1710
MK0/ML0	FS6305A	7.22	N/A	1610
MMO	FS5306A	9.01	N/A	1610
MNC	FS5205B	6.82	N/A	1610
MNK/MP8	MD3060P	3.49/2.28	N/A	1710
MNZ/MTP	MD3560P	4.59/2.28	N/A	1710
MPU	FS5205A	7.52	N/A	1610
MSC	FS4205B	6.99	N/A	1550
MSG	FS4205A	8.05	N/A	1610
MT9	AT542	6.07	N/A	1610
MUT	RT6609	12.72	N/A	1710
MWO	FS6306A	9.01	N/A	1710

Engine 6.6L Diesel Cat. '3116' Option LVY			215 GHP @ 2600 RPM 605 lb. ft. Gross Torque @ 1560 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	1710	1710
ME5	MT653DRD	18.09	1710HD	1710HD
MK0	FS6205A	7.22	1610	1610
MK9	ES066	7.48	1610	1610
ML0	FS6205B	7.22	1610	1610
MNK/MP8	MD3060P	3.49/2.28	1710	1710
MNZ/MTP	MD3560P	4.59/2.28	1710	1710
MUT	RT6609	12.72	1710	1710
MWO	FS6306A	9.01	1710	1710

Engine 6.6L Diesel Cat. '3116' Option LQZ/LVZ			LQZ - 230 GHP @ 2600 RPM LVZ - 250 GHP @ 2600 RPM 650 lb. ft. Gross Torque @ 1560 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	1710HD	1710HD
ME5	MT653DRD	18.09	1710HD	1710HD
MK0	FS6205A	7.22	1610	1610
MK9	ES066	7.48	1710	1710
ML0	FS6205B	7.22	1610	1610
MNK/MP8	MD3060P	3.49/2.28	1710	1710
MNZ/MTP	MD3560P	4.59/2.28	1710	1710
MUT	RT6609	12.72	1710	1710
MWO	FS6306A	9.01	1710	1710

Engine 6.6L Diesel Cat. '3116' Option LRU			275 GHP @ 2450 RPM 735 lb. ft. Gross Torque @1470 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MNK/MP8	MD3060P	3.49/2.28	1710	1710
MTP/MNZ	MD3560P	4.59/2.28	1710	1710

Engine 6.6L Diesel Cat. '3116' Option LVU			300 HP @ 2600 RPM 732 lb. ft. Torque @ 1560 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MNK/MP8	MD3060P	3.49/2.28	1710	1710
MNZ/MTP	MD3560P	4.59/2.28	1710	1710
ME2	MD3060P		N/A	1710

* With 23,000 lb. capacity rear axle joint series is upgraded to 1550

Engine LG5 7.2L Diesel Cat. '3126' Option LSV			175 GHP @ 2200 RPM 420 lb. ft. Gross Torque @1440 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	N/A	1610
ME5	MT653DRD	18.09	N/A	1710
MF1	AT545	6.76	N/A	1550
MMO	FS5306A	9.01	N/A	1610
MNC	FS5205B	6.82	N/A	1550
MNK/MP8	MD3060P	3.49	N/A	1610
MPU	FS5205A	7.52	N/A	1610
MSC	FS4205B	6.99	N/A	1550
MSG	FS4205A	8.55	N/A	1610
MT9	AT542	6.07	N/A	1550
MWO	FS6306A	9.01	N/A	1610
MK8	ES052–7B	10.09	N/A	1610

Engine LG5 7.2L Diesel Cat. '3126' Option LSW			190 GHP @ 2200 RPM 520 lb. ft. Gross Torque @1440 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	1610	1610
ME5	MT653DRD	18.09	N/A	1710
MF1	AT545	6.76	N/A	1610
MK0	FS6305A	7.22	N/A	1610
MK8	ES052-7B	10.09	N/A	1610
MK9	ES066-7B	7.48	N/A	1710
ML0	FS6305B	7.22	N/A	1610
MMO	FS5306A	9.01	N/A	1610
MNC	FS5205B	6.82	1610	1610
MNK/MP8	MD3060P	3.49	N/A	1710
MNZ/MTP	MD3560P	4.59	N/A	1710
MPU	FS5205A	7.52	N/A	1610
MT3	RT8908LL	19.58	1710	1710
MUT	RT6609	12.72	1710	1710
MWO	FS6306A	9.01	N/A	1710
M69	FS08306	6.62	N/A	1710
MT9	AT542	6.07	N/A	1610

Engine LG5 7.2L Diesel Cat. '3126' Option LRQ			210 GHP @ 2200 RPM 605 lb. ft. Gross Torque @1440 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	1710	1710
ME5	MT653DRD	18.09	1710HD	1710HD
MK0	FS6305A	7.22	N/A	1610
MK9	ES066-7B	7.48	1710	1710
ML0	FS6305B	7.22	N/A	1610
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	1710	1710
MUT	RT6609	12.72	1710	1710
MWO	FS6306A	9.01	1710	1710
M69	FS08306A	6.62	N/A	1710
MT3	RT8908LL	19.58	1710HD	1710HD
MPU	FS5205A	7.52	N/A	1610
MMO	FS5306A	9.01	N/A	1610
MWO	FS6306A	9.01	1710	1710

Engine LG5 7.2L Diesel Cat. '3126' Option LSX			210 GHP @ 2400 RPM 520 lb. ft. Gross Torque @1440 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	1610	1610
ME5	MT653DRD	18.09	1710HD	1710HD
MK0	FS6305A	7.22	N/A	1610
MK8	ES052-7B	10.09	N/A	1610
MK9	ES066-7B	7.48	1710	1710
ML0	FS6305B	7.22	N/A	1610
MMO	FS5306A	9.01	N/A	1610
MNC	FS5205B	6.82	1610	1610
MNK/MP8	MD3060P	3.49	N/A	1710
MNZ/MTP	MD3560P	4.59	N/A	1710
MPU	FS5205A	7.52	N/A	1610
MT3	RT8908LL	19.58	N/A	1710
MUT	RT6609	12.72	1710	1710
MWO	FS6306A	9.01	N/A	1710
M69	FS08306A	6.62	N/A	N/A

Engine LG5 7.2L Diesel Cat. '3126' Option LRR			250 GHP @ 2200 RPM 800 lb. ft. Gross Torque @1440 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	N/A	1710HD
MT3	RT8908LL	19.58	N/A	1710HD
M69	FS08306A	6.62	1710	1710

Engine LG5 7.2L Diesel Cat. '3126' Option LQV			250 GHP @ 2200 RPM 660 lb. ft. Gross Torque @1440 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	1710HD	1710HD
ME5	MT653DRD	18.09	1710HD	1710HD
MK0	FS6305A	7.22	1610	1610
MK9	ES066-7B	7.48	1610	1610
ML0	FS6305B	7.22	1610	1610
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	1710HD	1710HD
MT3	RT8908LL	19.58	N/A	1710HD
MUT	RT6609	12.72	1710	1710
MWO	FS6306A	9.01	1710	1710
M69	FS08306A	6.62	1710	1710

Engine LG5 7.2L Diesel Cat. '3126' Option LSZ			230 GHP @ 2200 RPM 660 lb. ft. Gross Torque @1440 RPM	
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
ME3	MT643D	8.77	1710HD	1710HD
ME5	MT653DRD	18.09	1710HD	1710HD
MK0	FS6305A	7.22	1610	1610
ML0	FS6305B	7.22	1610	1610
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	1710HD	1710HD
MT3	RT8908LL	19.58	N/A	1710HD
MUT	RT6609	12.72	1710	1710
MWO	FS6306A	9.01	1710	1710
M69	FS08306A	6.62	1710	1710
MK9	ES066–7B	7.48	1710	1710

Engine LG5			275 GHP @ 2200 RPM 800 lb. ft. Gross Torque @1440 RPM	
7.2L Diesel Cat. '3126' Option LQW				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	N/A	N/A
MT3	RT8908LL	19.58	N/A	1710HD
M69	FS08306A	6.62	1710	1710

Engine LG5			275 GHP @ 2200 RPM 860 lb. ft. Gross Torque @1440 RPM	
7.2L Diesel Cat. '3126' Option LRS				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	N/A	1710HD
MT3	RT8908LL	19.58	N/A	1710HD

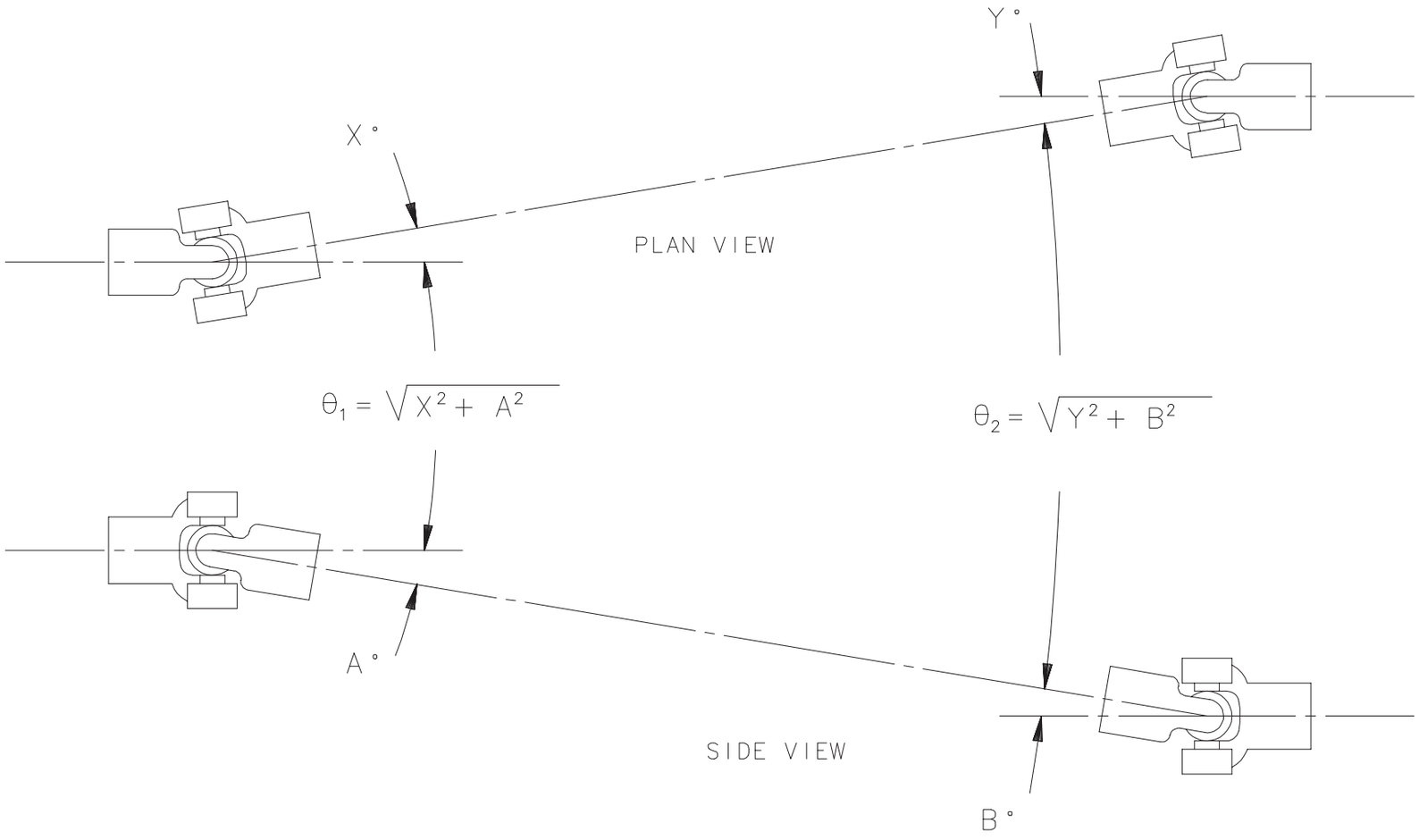
Engine LG5			300 GHP @ 2200 RPM 800 lb. ft. Gross Torque @1440 RPM	
7.2L Diesel Cat. '3126' Option LQX				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	N/A	1710HD
MT3	RT8908LL	19.58	N/A	1710HD
M69	FS08306A	6.62	1710	1710

Engine LG5			300 GHP @ 2200 RPM 860 lb. ft. Gross Torque @1440 RPM	
7.2L Diesel Cat. '3126' Option LRT				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
MNK/MP8	MD3060P	3.49	1710	1710
MNZ/MTP	MD3560P	4.59	1710	1710
MS9	RT8709H	13.29	N/A	1710HD
MT3	RT8908LL	19.58	N/A	1710HD

Engine LG4			200 GHP @ 2400 RPM 452 lb. ft. Gross Torque @1500 RPM	
7.8L Diesel Option LQB				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
M54	MLD6Q	6.72	N/A	1550
MF1	AT545	6.76	N/A	1550

Engine LG4			230 GHP @ 2400 RPM 517 lb. ft. Gross Torque @1500 RPM	
7.8L Diesel Option LQC				
RPO	Transmission	Low Gear	Rear Axle (U-Joint Series)	
			Tandem 064	Single 042
M54	MLD6Q	6.72	N/A	1610

U–Joint Angle and Equivalent Cancellation

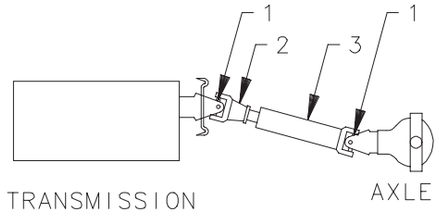


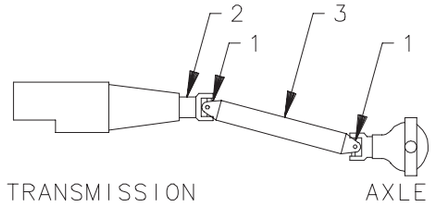
TO EFFECTIVELY CONTROL THE NON–UNIFORM MOTION EFFECTS
OF A CARDAN U–JOINT OPERATING AT AN ANGLE, IT IS
NECESSARY TO KEEP U–JOINT ANGLES ON EACH OF THE
DRIVE SHAFT AS EQUAL TO ONE ANOTHER AS POSSIBLE.
OPTIMUM DRIVE SHAFT INSTALLATION PRACTICE LIMITS THE
INEQUALITY OF THESE ANGLES TO BE THE EQUIVALENT OF
A SINGLE U–JOINT OPERATING AT LESS THAN 3°
TO DETERMINE THE EFFECTIVE CANCELLATION OF THE UNIVERSAL
JOINT ANGLES IN YOUR DRIVE SHAFT INSTALLATION USE THE FOLLOWING

EFFECTIVE CANCELLATION $\theta_{RES} = \sqrt{\theta_1^2 - \theta_2^2}$

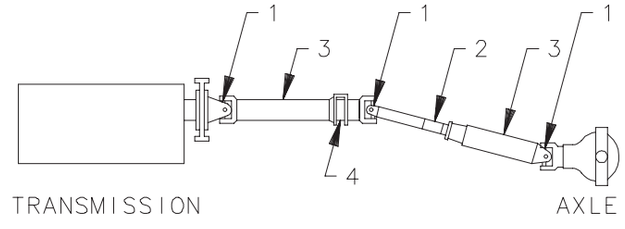
SHIMMING OF YHE AXLE IS RECOMMENDED TO EQUALIZE THE ANGLES

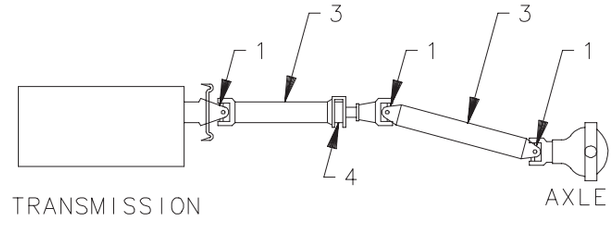
Typical Installation Showing Yokes in Phase



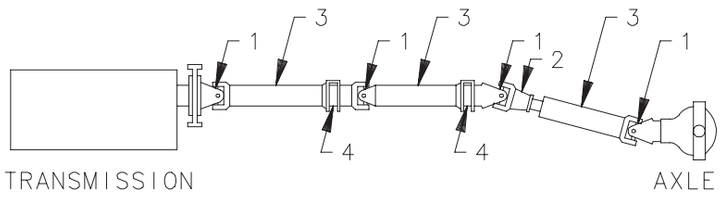


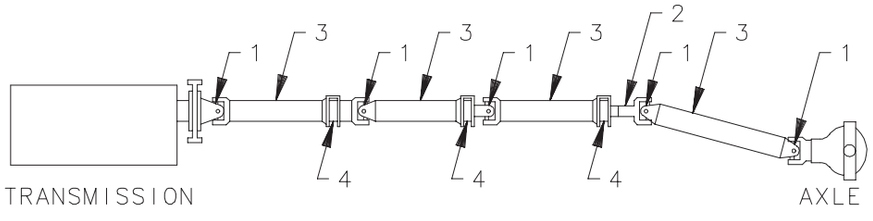
SINGLE SHAFT TYPE



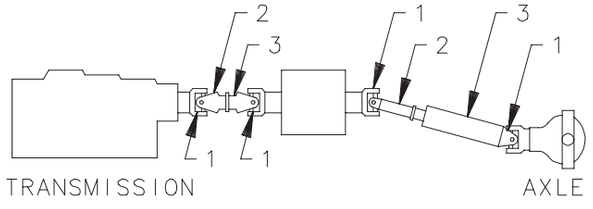


DUAL SHAFT TYPE





MULTI–SHAFT TYPE



WITH AUXILIARY TRANSMISSION TYPE

1. UNIVERSAL JOINT
2. SLIP YOKE
3. SHAFT
4. CENTER BEARING

"IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPSHAFT ASSEMBLY ARE IN THE SAME PLANE